

WHAT IS CLAIMED IS:

1. An electronic circuit for amplitude-modulating digital data transmitted via an antenna including a resonance circuit, said electronic circuit comprising:

a modulation circuit, having a first transistor, for amplitude-modulating a carrier wave applied to the base of said first transistor into an amplitude-modulated wave in accordance with a signal wave applied to the emitter of said first transistor and for supplying said amplitude-modulated wave to said antenna via the collector of said first transistor; and

a signal-wave generation circuit for inputting a first pulse signal in a rectangular waveform corresponding to said digital data, for generating said signal wave in such a manner as to correspond to a second pulse signal whose waveform is shaped so that the level at each rise time of each pulse of said first input pulse signal becomes higher than the high level in a steady state of said first signal and the level at each fall time of each pulse of said first input pulse signal becomes lower than the low level in the steady state of said first signal, and for applying said generated signal wave to the emitter of said first transistor.

2. An electronic circuit according to Claim 1, wherein said signal-wave generation circuit comprises:

a load circuit, which serves as an emitter load of said first transistor;

a load varying circuit for varying the emitter load of said load circuit in accordance with said first pulse signal; and

an extraction circuit for extracting high-frequency components of said first pulse signal,

wherein said signal wave corresponding to said second pulse signal is generated by applying, to said load circuit, said high-frequency components of said first pulse signal extracted by said extraction circuit.

3. An electronic circuit according to Claim 2, wherein said extraction circuit is a differentiation circuit.

4. An electronic circuit according to Claim 2, wherein said signal-wave generation circuit further comprises a buffer connected to the input of said extraction circuit.

5. An electronic circuit according to Claim 2, wherein said load varying circuit comprises a second transistor that functions as a switch which is switched in accordance with said first pulse signal applied to the base, varies the

emitter load by disconnecting, from said load circuit, a predetermined element which serves as a portion of an emitter load when said second transistor is turned off and by connecting said disconnected element to said load circuit when said second transistor is turned on, and

said signal-wave generation circuit further includes an inverter circuit connected to the input of said extraction circuit.

6. An electronic circuit according to Claim 5, wherein said inverter circuit is formed of a third transistor which functions as a switch, and a resistor.

7. An electronic circuit according to Claim 6, wherein said inverter circuit comprises, as said third transistor, a set of an NPN-type transistor and a PNP-type transistor.

8. An electronic circuit according to Claim 7, wherein said inverter circuit further comprises a Schottky diode connected between the base and the collector of each of said NPN-type transistor and said PNP-type transistor.

9. An electronic circuit according to Claim 2, wherein there are a plurality of said first transistors,  
an emitter resistor differing from the resistor which

forms said load circuit is connected to the emitter of one or more of first predetermined transistors among said plurality of first transistors, and

said signal-wave generation circuit applies said signal wave corresponding to said second pulse signal such that the waveform of said first pulse signal is shaped, to the emitter of said first transistors excluding some transistors such that the emitter is connected to said emitter resistor among said plurality of first transistors.

10. A modulation method for use with a modulation circuit, having a transistor, which amplitude-modulates digital data transmitted via an antenna including a resonance circuit, for amplitude-modulating a carrier wave applied to the base of said transistor into an amplitude-modulated wave in accordance with a signal wave applied to the emitter of said transistor and for supplying said amplitude-modulated wave to said antenna via the collector of said transistor, said modulation method comprising the steps of:

inputting a first pulse signal in a rectangular waveform corresponding to said digital data;

generating said signal wave in such a manner as to correspond to a second pulse signal whose waveform is shaped so that the level at each rise time of each pulse of said

first input pulse signal becomes higher than the high level in a steady state of said first signal and the level at each fall time of each pulse of said first input pulse signal becomes lower than the low level in the steady state of said first signal; and

applying said generated signal wave to the emitter of said transistor.

11. An electronic circuit for amplitude-modulating digital data transmitted via an antenna including a resonance circuit, said electronic circuit comprising:

a modulation circuit, having a field-effect transistor, for amplitude-modulating a carrier wave applied to the gate of said field-effect transistor into an amplitude-modulated wave in accordance with a signal wave applied to the source of said field-effect transistor and for supplying said amplitude-modulated wave to said antenna via the drain of said field-effect transistor; and

a signal-wave generation circuit for inputting a first pulse signal in a rectangular waveform corresponding to said digital data, for generating said signal wave in such a manner as to correspond to a second pulse signal whose waveform is shaped so that the level at each rise time of each pulse of said first input pulse signal becomes higher than the high level in a steady state of said first pulse

signal and the level at each fall time of each pulse of said first input pulse signal becomes lower than the low level in the steady state of said first pulse signal, and for applying said generated signal wave to the source of said field-effect transistor.

12. A modulation method for use with a modulation circuit, having a field-effect transistor, which amplitude-modulates digital data transmitted via an antenna including a resonance circuit, for amplitude-modulating a carrier wave applied to the source of said field-effect transistor into an amplitude-modulated wave in accordance with a signal wave applied to the source of said field-effect transistor and for supplying said amplitude-modulated wave to said antenna via the drain of said field-effect transistor, said modulation method comprising the steps of:

inputting a first pulse signal in a rectangular waveform corresponding to said digital data;

generating said signal wave in such a manner as to correspond to a second pulse signal whose waveform is shaped so that the level at each rise time of each pulse of said first input pulse signal becomes higher than the high level in a steady state of said first pulse signal and the level at each fall time of each pulse of said first input pulse signal becomes lower than the low level in the steady state

of said first pulse signal; and

applying said generated signal wave to the source of said field-effect transistor.

13. An information processing device for amplitude-modulating first digital information and transmitting the information, said information processing device comprising:

modulation means, having a transistor, for amplitude-modulating a carrier wave applied to the base of said transistor into an amplitude-modulated wave in accordance with a signal wave which corresponds to said first information, the signal wave being applied to the emitter of said transistor, and for outputting said amplitude-modulated wave via the collector of said transistor;

first output means for outputting said carrier wave applied to the base of said transistor;

second output means for outputting a first pulse signal in a rectangular waveform corresponding to said first information;

signal-wave generation means for generating said signal wave in such a manner as to correspond to a second pulse signal whose waveform is shaped so that the level at each rise time of each pulse of said first pulse signal output from said second output means becomes higher than the high level in a steady state of said first signal and the level

at each fall time of each pulse of said first pulse signal becomes lower than the low level in the steady state of said first signal, and for applying said generated signal wave to the emitter of said first transistor; and

antenna means, having a resonance circuit, for transmitting an electromagnetic wave based on said amplitude-modulated wave output from said modulation means to another information processing device.

14. An information processing device according to Claim 13, further comprising:

detection means for detecting varied components of a waveform corresponding to second digital information which is transmitted from said other information processing device and which is received by said antenna means; and

demodulation means for demodulating the signal corresponding to said second digital information from the varied components of said waveform detected by said detection means.

15. An information processing device according to Claim 14, wherein said other information processing device is an IC card capable of non-contact communication, and

said information processing device is a reader/writer device that writes said first information into said IC card



and reads said second information from said IC card by performing non-contact communication with said IC card via said antenna means.

16. An information processing method for use with an information processing device comprising a modulation circuit, having a transistor, for amplitude-modulating a carrier wave applied to the base of said transistor into an amplitude-modulated wave in accordance with a signal wave which corresponds to digital information to be transmitted, the signal wave being applied to the emitter of said transistor, and for outputting said amplitude-modulated wave via the collector of said transistor; and

an antenna, having a resonance circuit, for transmitting an electromagnetic wave based on said amplitude-modulated wave output from said modulation circuit to another information processing device, said information processing method comprising the steps of:

outputting said carrier wave applied to the base of said transistor;

outputting a first pulse signal in a rectangular waveform corresponding to said digital information;

generating said signal wave in such a manner as to correspond to a second pulse signal whose waveform is shaped so that the level at each rise time of each pulse of said

first pulse signal becomes higher than the high level in a steady state of said first pulse signal and the level at each fall time of each pulse of said first pulse signal becomes lower than the low level in the steady state of said first pulse signal; and

applying said generated signal wave to the emitter of said first transistor.